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Fifty Years of Research in Food Processing at Summerland, British Columbia

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Fifty Years of Research in Food Processing at Summerland, British Columbia

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The Research Branch of Agriculture Canada endeavors to serve all phases of Canadian agriculture. At each of the 56 research establishments across Canada scientists work to solve agricultural problems specific to their region; but together, all cooperate to provide a continuously expanding fund of technical knowledge that can be used by everyone working in Canada's agricultural industry.

Studies at the Research Station at Summerland deal mainly with the problems of producing, harvesting, storing, and processing the tree-fruit crops of British Columbia's Okanagan Valley. This publication outlines 50 years of progress by the Food Processing Section at the Research Station, Agriculture Canada's first food research laboratory, which is celebrating a half century of service to the Canadian food-processing industry.

The story of the Food Processing Section at Summerland began June 13, 1929, when the Canadian government's first food technologist, F. E. (Ted) Atkinson, returned to the Okanagan Valley from Oregon State University with a specialist degree in fruit and vegetable processing technology. Upon joining the staff of the Dominion Experimental Station at Summerland, his first assignment was to assist the local fruit dehydration and canning industry. From 1929 to 1935 he studied sun-drying and forced-air dehydration of apricots; dehydration of prunes; canning of prunes, apricots, peaches, pears, tomatoes, and green beans; and candying of cherries.

From the beginning, the Food Processing Section has been strongly oriented toward industry. Between 1929 and 1933 the Section was responsible for drying, packing, and marketing commercial quantitites of sun-dried apricots and dehydrated prunes and apples for the Dehydration Committee of Agriculture Canada. This work exposed the need for commercially viable products and processes, concerns which prompted the establishment of a research philosophy that is followed to this day.

In 1933 the staff was increased with the appointment of C. C. (Charlie) Strachan as chemist. Atkinson and Strachan worked together to develop an apple juice processing industry in Canada, to utilize Canadian cherries in candied fruit, and to develop an automated process for fruit candying.

New ways to use surplus crops were always being sought, so some efforts were made in 1930 and 1931 to develop an apple brandy and a series of liqueurs based on apple alcohol. Although these products proved uneconomic, the apple juice processes subsequently developed have aided in the growth of an industry in Western Canada currently valued at $25 million a year.

The staff's knowledge of dehydration greatly benefited the Canadian food industry during the Second World War. Between 1939 and 1945 production of dehydrated fruits and vegetables was increased many fold to help feed the military and civilian populations in Great Britain.

Also during wartime, Canada began fortifying its apple juice with ascorbic acid as a source of vitamin C. The Food Processing Section developed the quality control methods used to determine the amount of vitamin C in clarified apple juice and was instrumental in developing the technology for commercial production of opalescent apple juice in Canada. With this work began the Section's long association with the apple-processing cooperatives owned by the fruit growers, which later amalgamated to become Sun Rype Products Ltd., the largest apple processor in Canada. During the past 30 years, more than a dozen new products and processes have been introduced as a result of cooperative research and development with this one company. Products, processes, and processing equipment developed in cooperation with other Canadian companies number in the hundreds. Many ideas have been applied elsewhere around the world.

In the immediate postwar era, the staff of the Food Processing Section was increased by the addition of food technologist Adrian Moyls in 1945. In 1948 the food chemistry and food microbiology units of the Science Service were established at Summerland and housed in the Food Processing Section. These groups provided a regulatory analysis service for the Fruit and Vegetable Division of the Department's Production and Marketing Branch.

In 1959, the Experimental Farms Service and the Science Service were amalgamated to form the Research Branch of Agriculture Canada. Staff members of the food chemistry and food microbiology units of the Science Service who then became part of the Food Processing Section were microbiologist John Bowen, who had joined the Department in 1948; chemist John Ruck, who had joined in 1949; and microbiologist Eric Smith and food technologist John Kitson, both of whom began with the Department in 1950. Bowen retired in 1976, and Ruck in 1971.

1 Horticultural building, 1929, where early dehydration experiments were conducted.

2 Simple jam kettle heated directly by a sawdust burner, designed for a small plant.

3 Original experiment in apple juice deaeration, 1948.

4 First commercial pack of opalescent apple juice, 1949. This process was developed by the Section during the 1940s. *Photo credit*: Sun Rype Products Ltd., Kelowna, B.C.

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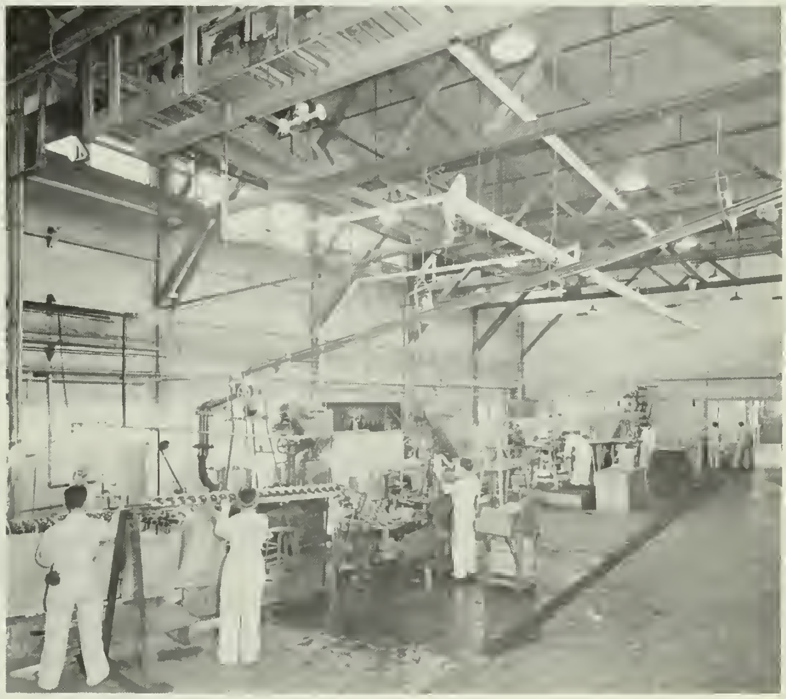

5 Ted Atkinson, founder and Head of the Section from 1929 to 1965, recording heat penetration data, 1952

6 A cherry candying experiment Charlie Strachan was a research scientist with the Section from 1935 to 1956

7 John Bowen doing a mold count with technical assistance from Charlotte Davis, 1952 John joined the Department in 1948 and transferred to the Section in 1959 He retired in 1976

Home economist Dorothy Britton was appointed in 1952 to staff the then newly constructed test kitchen.

Since 1957, the size of the Section's staff has remained relatively constant. Dugal MacGregor was appointed in 1957 to replace Charlie Strachan, who had moved to become Director of the Research Station, Morden, Man. In 1959 Strachan returned as Director of the Research Station at Summerland, where he served until his death in 1971. In 1965, Ted Atkinson retired after 36 years as Head of the Food Processing Section. He was succeeded by Dugal MacGregor until 1971 and since then by John Kitson. Adrian Moyls retired in 1972 and was replaced by Darrell Wood, who served as food technologist and enologist until 1976. Most recently appointed to the professional staff were food biochemist Hans Buttkus in 1974 and enologist Gary Strachan in 1977.

Among the present technical staff of the Section, Howard Wright joined in 1962, Madeline Darling in 1976, Barbara Edwards in 1977, and Richard MacDonald in 1978.

Food research at Summerland has been further strengthened in recent years by the cooperation of agricultural engineer Peter Parchomchuk and engineering technician Lance Brown, of the Soils and Engineering Section. These men deal with problems in design of food processing equipment.

The staff of the Food Processing Section combine to provide an extremely comprehensive knowledge of food-processing technologies. Although their expertise is mainly in fruit and vegetable processing, various staff members also have specialized knowledge of tropical products, cereals, dairy products, fermentation products, solid and liquid waste treatment, and specialty products formulation. The range of research currently being conducted in the Section illustrates the wide use industry makes of these services.

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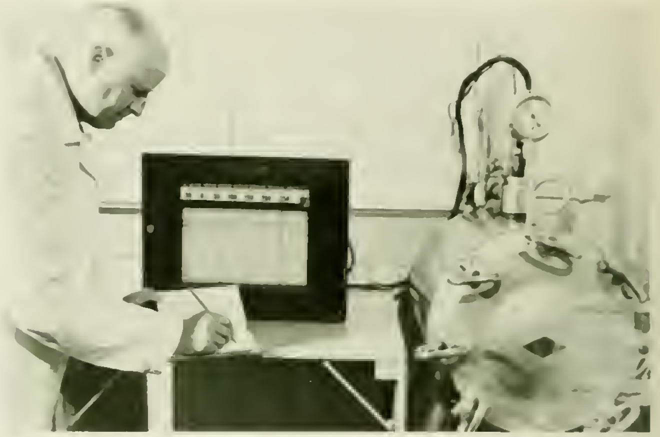

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8 Analyzing fruit cocktail, Charlie Strachan.

9 Adrian Moyls and Dorothy Britton, who joined in 1945 and 1952, respectively, evaluating commercial samples of fruit pie fillings developed by the Section, 1956. Adrian retired in 1972.

10 B.C. sparkling cider, a development patented by the Section in 1959.

11 Prototype of a continuous vacuum treatment system, Barkwills Ltd., Summerland, 1966.

12 Preparing an experimental sample of jam in a vacuum kettle, Adrian Moyls, 1957.

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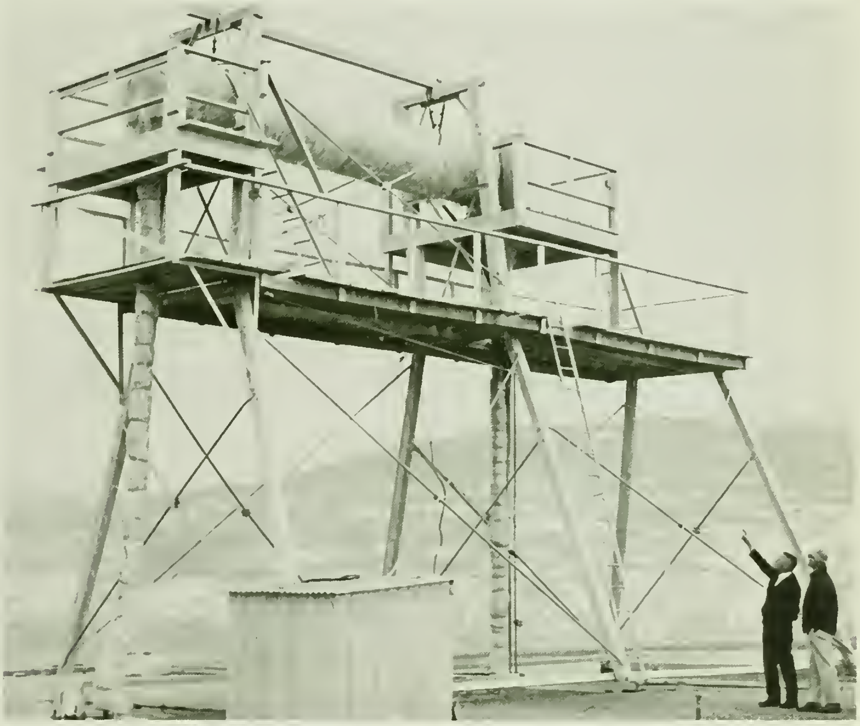

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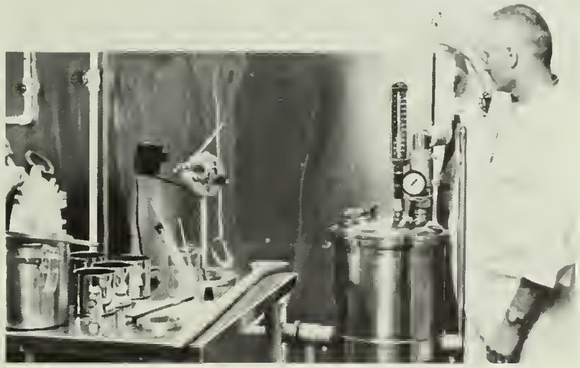

New or improved processing techniques and equipment

Major developments include: a rapid, continuous process for manufacturing candied fruit, now used world wide; the present, commercially used processes for manufacturing opalescent and "crushed" apple juices; continuous vacuum treatment equipment for pretreating canned apple slices, now used in Canada, the United States, and Australia; a caustic peeler for Canadian freestone peaches, in which potassium hydroxide replaces sodium hydroxide; the Rolltherm cooker-cooler for rapid, continuous processing of fruit in 2.8 L (100-fl oz) cans, used in Canada and Australia; the world's first and only continuous, automatic vacuum jam-processing line; a semicommercial-scale, vacuum aroma-concentration column for producing extremely high-strength fruit essences; a process for encapsulating fruit essence concentrates in a stable, dry-powdered form; and a process for encapsulating oil-soluble vitamins and natural pigments in an instantly dispersible, dry form.

Equipment and processes currently being developed include: a continuous system for commercially sterilizing flexible containers for high-acid foods; a new system for agitating large cans during rapid heat-processing of viscous, low-acid, pureed foods; a blancher for commercially canned or frozen vegetables, which eliminates all dilute effluent arising from the blanching process by producing a usable concentrate; an automatic aligner for asparagus, which detects and separates spears passing the sensing head with butt ends first rather than with tip ends first; and a process for removing bitterness and green pigment from juice recovered from celery trimmings.

The Food Processing Section has received two international awards for process and equipment development. The awards were presented at the Salon International D'Alimentation (S.I.A.) in Paris, in 1968 for development of the Rolltherm cooker-cooler, and in 1970 for the aroma encapsulation process.

New or improved food products

Major developments include: fruit juice blends based on combinations of apple juice with other temperate zone and tropical fruit juices and purees; many single-fruit and blended-fruit jams; canned fruit pie fillings; frozen fruit crisps; canned fruit puddings; fruit-juice-based pancake syrups; fruit-based candies; fruit for yoghurt sauce; fruit chutney and chutney sauces; frozen and canned "baked" apples; candied rutabaga; and batter-coated frozen vegetable bars.

Products currently being developed or tested include: fruit products in flexible containers; compressed freeze-dried foods for military field rations and survival packs; and vegetable juice blends utilizing decolorized, debittered celery juice.

Wine-making processes and new grape varieties for wines or juices

Approximately 150 grape varieties are being evaluated for suitability for juice making and wine making. Improvements in wine-making processes are aimed at refining aroma and flavor, reducing excessive acidity, and eliminating spoilage in wines packed in bulk in flexible containers.

Utilization of plant-leaf protein

This new program involves extraction, purification, and determination of the functional properties of protein fractions from several edible plant-leaf materials. Current emphasis is on separation of protein from plant wastes such as celery and carrot trimmings.

Industry services

A wide range of technical assistance is offered by the Section to industry, both in Canada and around the world. Aid has been provided in: design of equipment layouts; building design; design of waste treatment or utilization systems; assessment of heat-transfer rates in canned and frozen foods; solution of food-spoilage problems; and processing methods for both temperate zone and tropical fruits and vegetables.

Staff members have visited and provided technical advice to food processing firms in more than 25 countries in Europe, Asia, Africa, Australasia, and North and South America. In addition, the Section has provided specialized training at Summerland in various facets of processing technology to food processors from several developing countries. These services to industry were recognized in 1977 by the presentation of the W. J. Eva award for outstanding research and service to the Food Processing Section by the Canadian Institute of Food Science and Technology.

13 Dugal MacGregor, who joined in 1957 and was Head of the Section from 1965 to 1971, and John Kitson, who joined in 1950 and began serving as Head in 1971, recovering essence from apple puree, 1972.

14 Racking wine in the pilot fermentation room. Eric Smith began working in the Section in 1950.

15 Dorothy Britton evaluating bread containing apple fiber.

16 Dugal MacGregor testing a low effluent blancher.

17 Howard Wright injecting a sample for analysis into a gas chromatograph. Howard joined the staff in 1962.

18 Peter Parchomchuk and John Kitson evaluating an agitating retort system. Peter began working on a shared basis in the Section in 1974.

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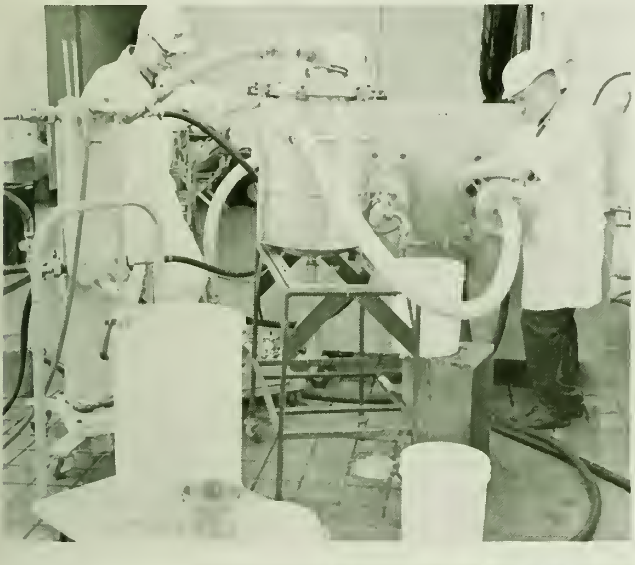

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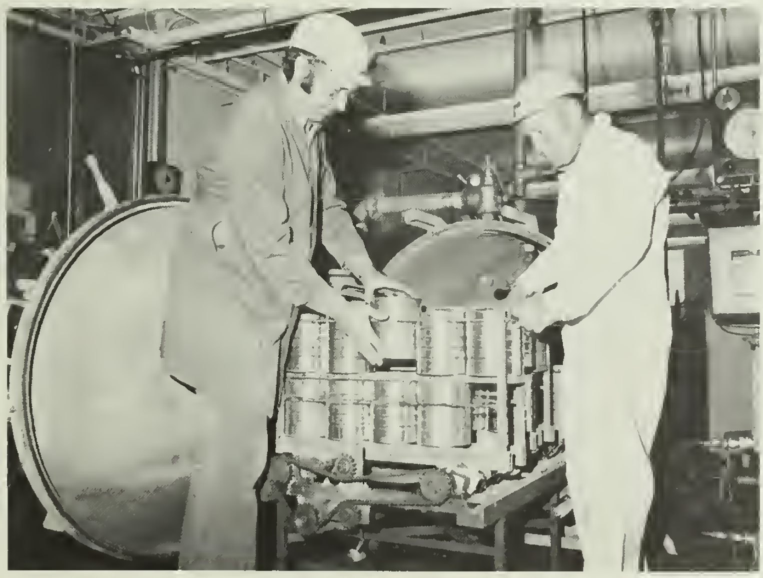

Professional Staff
Research Station, Summerland, British Columbia
with technical staff of Food Processing Section

G. C. Russell, B.S., M.S., Ph.D.	Director
H. F. Madsen, B.A., Ph.D.	Assistant Director
L. C. Godfrey, B.Sc.	Administrative Officer

Food Processing Section

Research Scientists

J. A. Kitson, B.A., M.S.
Head of Section; Process development

D. R. MacGregor, B.S.A., M.S., Ph.D.
Product development and microbiology

G. E. Strachan, B.S.A., SM
Enology and food technology

H. A. Buttkus, B.S.A., M.A.
Food biochemistry

P. Parchomchuk, B.A.Sc., M.A.
Engineering (shared position, Soils and Engineering Section)

Technicians

D. Britton, Dip. H.Ec.
Home economics

L. Brown
Engineering (shared position, Soils and Engineering Section)

M. Darling, BHc.
Product development and nutrition

B. Edwards, B.Sc., M.Sc.
Nutrition and microbiology

R. A. MacDonald, B.S.A.
Grape culture and enology (shared position, Pomology Section)

E. S. Smith, B.S.A.
Enology and microbiology

H. T. Wright
Instrumental analysis and equipment development

Entomology Section

R. D. McMullen, B.Sc., M.Sc., Ph.D.
Head of Section; Bionomics of pear psylla

F. L. Banham, B.S.A.
Stone fruit insects

R. S. Downing, B.A., M.Sc.
Orchard mite control

A. P. Gaunce, B.Sc., M.Sc., Ph.D.
Pesticide and environmental chemistry

H. F. Madsen, B.A., Ph.D.
Integrated control

M. D. Proverbs, B.Sc., M.Sc., Ph.D.
Control of codling moth by sterility method

Pomology Section

N. E. Looney, B.S., M.S., Ph.D.
Head of Section; Growth regulants and agrometeorology

L. G. Denby, B.S.A., M.S.A., F.R.H.S.
Rootstock and variety evaluation - grape breeding

W. D. Lane, B.Sc. (Agric.), M.Sc., Ph.D.
Fruit breeding - hardiness

M. Meheriuk, B.Sc., B.Ed., M.Sc., Ph.D.
Fruit biochemistry

S. W. Porritt, B.S.A., M.S., Ph.D.
Fruit storage

Plant Pathology Section

D. L. McIntosh, B.S.A., Ph.D.
Head of Section; Tree fruit fungus diseases

A. J. Hansen, Dip.Agr., M.Sc., Ph.D.
Tree fruit virus diseases

W. J. McPhee, B.A., M.Sc., Ph.D.
Tree fruit fungus diseases

J. T. Slykhuis, B.S.A., M.Sc., Ph.D.
Stone fruit virus diseases

Soils and Engineering Section

D. S. Stevenson, B.S.A., M.S., Ph.D.
Head of Section; Soil moisture

E. J. Hogue, B.S.A., M.S., Ph.D.
Vegetation management

P. Parchomchuk, B.A.Sc., M.S.
Agricultural equipment - development and assessment

19 Lance Brown, who began working on a shared basis in the Section in 1974, operating an experimental retort.

20 Barbara Edwards loading a grape press. Barbara joined the Section in 1977.

21 A pilot plant grape crusher in operation. Gary Strachan began work with the Section in 1977.

22 Testing a new steam blancher, Dugal MacGregor and Lance Brown.

23 Enology research team pressing grape juice for wine. Left to right: Gary Strachan, Eric Smith, Barbara Edwards.

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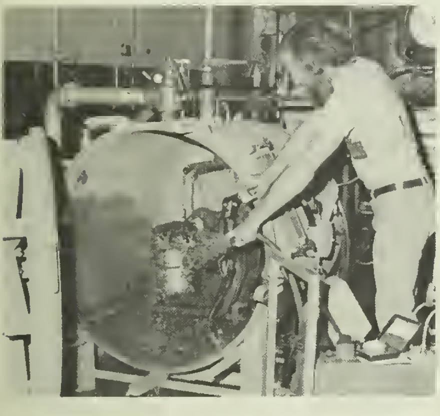

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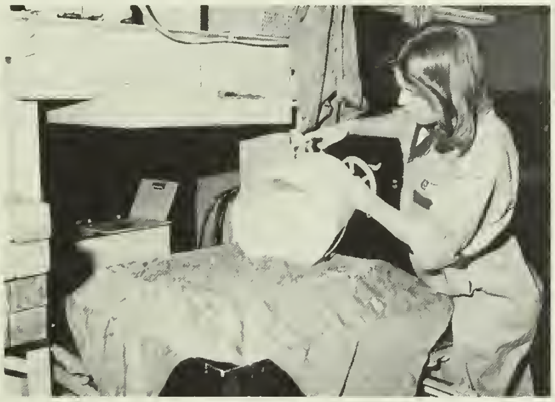

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